Preface

Soil and water management

Soil and water form the basis of all terrestrial life. Their resources vary widely and are affected by natural and anthropogenic perturbations. Ancient civilizations and cultures emerged and sustained on good soils; and some of them went into oblivion when soil and water resources were degraded irreversibly. Even during the contemporary period, good-quality soil and water resources form a powerful engine of economic development and ensured food security.

The impact of degradation of these two natural resources in terms of impairment in their physical, chemical and biological properties has attracted the attention of researchers in recent years. It is observed that the major soil types in the Indian semi-arid environment with mean annual rainfall of < 1000 mm are becoming calcareous with concomitant development of sodicity. Use of poor-quality irrigation water further aggravates these problems, resulting in reduced soil productivity. Both natural and human-induced degradation ultimately modifies the physical and chemical properties of soils that restrict the entry of rainwater and reduce the storage and release of soil water. Under the changing scenario, potable water is becoming scarce, forcing hydrologists to develop methods to filter sewage water.

This special section articulates some of these issues in a modest way through 15 research articles contributed by scientists engaged in soil and water research. Bhattacharyya *et al*. (**page 1652**) analyse temporal soil datasets in terms of different soil parameters keeping in view the trend of changes in the past as well as in the present, to predict the future of soil health. Against this background, the fertility of soils in the semi-arid tropics (SAT) has been detailed by Sahrawat (**page 1671**). The pedogenic processes that lead to the formation of calcium carbonate in soils and its adverse effects are summarized by Pal *et al*. (**page 1675**). The success story of 'Bhoochetana' initiative in Karnataka, in terms of technology adoption and scaling-up has been detailed by Chander *et al*. (**page 1683**). Introducing a legume crop in the SAT cropping calendar is a good practice to add extra organic carbon to preserve soil quality (Chowdhury *et al*., **page 1692**). Sawargaonkar and Wani (**page 1699**) suggest sweet sorghum as a smart biofuel crop, which can be grown under tropical rainfed conditions without sacrificing food and fodder security. Geomorphic information systems (GIS) the land-use/land-cover (LULC) map help to locate areas for groundwater recharge using check dams and dug-out ponds (Ahmed *et al*., **page 1704**). Water scarcity and elevated potential in wastewater treatment in the last decade bring into focus constructed wetlands (CWs). Kaushal *et al.* (**page 1710**) evaluate the efficiency of CWs for exclusion of faecal coliform and suggest that the CW-treated water might reduce faecal coliform to make it safe for irrigation. In the wake of water becoming a scarce commodity, a water input calculator has been devised to show its utility to save 30–50% irrigation water without sacrificing crop yield (Garg *et al.*, **page 1716**). Long-term simulation effects of conservation agriculture have been suggested as a remedy in reducing water stress in dry years of SAT to reduce the risk of crop failure (Patil *et al*., **page 1730**). Poor quality of irrigation water has been a cause of concern in the Indian SAT areas. This topic is dealt by Padekar *et al*. (**page 1740**) with facts and figures. Datta *et al*. (**page 1756**) and Tilak *et al*. (**page 1764**) respectively, show the utility of CWs in SAT areas in improving the quality of wastewater for use in agriculture. Livelihood issues have been discussed by Petare *et al*. (**page 1773**) to stress appropriate land-use planning based on land typology in the hilly areas. The SAT soils are prone to degradation yet show the resilience. Bhattacharyya *et al*. (**page 1784**) discuss ways for making these soils resilient. This special section brings together the approaches to manage soil and water resources sustainably for improving livelihoods of small farm holders.

The research output for these articles was generated from different projects financed through various agencies. We thank ICRISAT, Patancheru for support.

An endeavour of this nature would not have been possible without the support of a large number of colleagues who contributed these 15 articles. We are grateful to all these authors.

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